

Research Summary

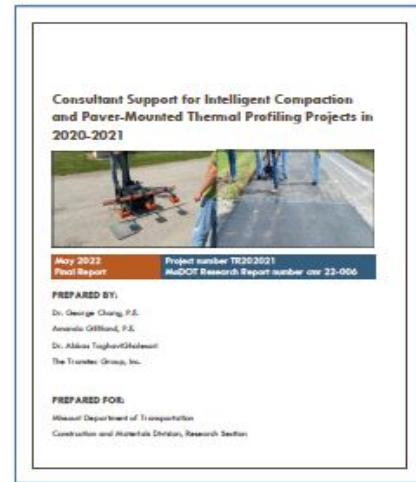
Consultant Support for Intelligent Compaction and Paver-Mounted Thermal Profiling Projects in 2020-2021

The MoDOT 2017-2019 Intelligent Compaction and Paver-Mounted Thermal Profiling (IC-PMTP) projects demonstrated paving quality improvements on numerous field projects. Therefore, MoDOT established a plan to include additional IC-PMTP projects in 2020 and 2021. The primary goal of this project was to ensure continued success of the MoDOT IC-PMTP projects in 2020 and beyond. MoDOT procured consulting support (this project) for selected IC-PMTP projects in 2020-2021 and implemented many initiatives such as data quality assurance (QA), performance tracking, and future acceptance with IC-PMTP data.

This project's Scope of Work (SOW) included seven (7) main tasks from 3/16/2020 to 4/29/2022, spanning approximately 25 months.

This report is a summary of the completed work in 2021. The work completed during 2020 is summarized in a previous report. The primary findings from 2021 are as follows:

In-person training was disrupted by COVID-19. However, remote training was generally successful. There were learning curves because of the new software analysis features and data QA analysis procedures. Most of the common issues from 2020 were resolved before the 2021 season. The most common issues noted during



2021 quality checks were data management. It is recommended that AASHTO PP 114 Data Lot Names for use with Intelligent Construction Technologies" is piloted in 2022 and 2023 to standardize and improve data management. AASHTO PP 114 uses "data lot names" included in the header block of data. Implementing the data lot naming is compatible with the automated Veta filter group generation. Its adoption is recommended in future MoDOT IC-PMTP specifications after piloting it in 2022 and 2023.

There was a restructuring of MoDOT personnel related to IC-PMTP projects in 2021. Therefore, there was a learning curve as new personnel were trained on IC-PMTP protocols. The learning curve was particularly challenging for the data QA pilot projects, and therefore, there was limited QA data collected in 2021.

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The implementation of IC-PMTP is successful based on the data trends observed. For the first time since implementation, 100% of projects in 2021 achieved the 70% IC coverage thresholds, and 2021 showed more low thermal segregation classifications and less severe thermal



segregation classifications than previous years. These trends may indicate acceptance of technology by contractors, increased understanding, and successful implementation of IC.

MoDOT is one of the leading State DOTs focused on implementing data QA procedures for intelligent construction. The data QA procedures piloted in 2020 and 2021 are complex, requiring a basic understanding of Veta software and engineering judgment for a successful implementation. Long-term goals include adding a feature in Veta to automate the data QA process. Until then, the Excel macro tools that were developed are the best solution. Due to personnel restructuring, fewer data were collected for data QA in 2021. These state-of-the-art procedures will continue to have a steep learning curve, and training and technical support are recommended through workshops, project support, train-the-trainers training (TTT), and just-in-time training (JITT).

The temperature segregation index (TSI) and the cyclic fatigue index parameter S_{app} were calculated for different sublots, and a comparison between laboratory test results and in-situ parameters was conducted. This analysis is summarized in the 2020 annual report. Data is being collected to compare IC data and density. Approximately 75% of the data has been received to date. Performance tracking will continue under future contracts.



Figure 1: RDM 2.0 metal plate calibration.

Project Information

PROJECT NAME: TR202021—Consultant Support for Intelligent Compaction and Paver-Mounted Thermal Profiling Projects in 2020-2021

PROJECT START/END DATE: March 2020-April 2022

PROJECT COST: \$283,660

LEAD CONTRACTOR: The Transtec Group, Inc.

PRINCIPAL INVESTIGATOR: Dr. George Chang, P.E.

REPORT NAME: Consultant Support for Intelligent Compaction and Paver-Mounted Thermal Profiling Projects in 2020-2021

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